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Yuma Narita ”Hybrid inflation driven by the QCD axion”

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When the inflaton is coupled to the gluon Chern-Simons term for successful reheating, mixing between the inflaton and the QCD axion is generally expected given the solution of the strong CP problem by the QCD axion. This is particularly natural if the inflaton is a different, heavier axion. We propose a scenario in which the QCD axion plays the role of the inflaton by mixing with heavy axions. In particular, if the energy scale of inflation is lower than the QCD scale, a hybrid inflation is realized where the QCD axion plays the role of the inflaton in early stages. We perform detailed numerical calculations to take account of the mixing effects. Interestingly, the initial misalignment angle of the QCD axion, which is usually a free parameter, is determined by the inflaton dynamics. It is found to be close to π in simple models. This is the realization of the pi-shift inflation proposed in previous literature, and it shows that QCD axion dark matter and inflation can be closely related. The heavy axion may be probed by future accelerator experiments.

Session Classification: Short talks